East Anglian Library

MAY 7 1943

FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL
VOL. 69. No. 1389. APRIL 1, 1943
Registered at the G.P.O. as a Newspaper. Offices: 49, Wellington Street, Strand, London, W.C.2
Single Copy 6d. By Post 8d. Annual Subscription, Home and Overseas, 21/- (Prepaid).

ITISH
OULDING
ACHINE Co. LTD
VERSHAM, KENT.

Used by many leading foundries
DISTRIBOND
the PROVEN British substitute for Bentonite
DISTRICT CHEMICAL COMPANY LTD.
1-19, New Oxford Street London W.C.1

STEIN
REFRACTORIES
FOR EVERY PURPOSE
JOHN G. STEIN & CO. LTD.
BONNYBRIDGE, SCOTLAND

MANSFIELD
Moulding Sand
PULVERISED READY FOR USE AS REQUIRED
ALBION (Mansfield) SAND CO.
Proprietors: THOS. W. WARD LTD. Sheffield

ENAMELLING MUFFLES
Airheaters and Drying Plant, Works Layout and Equipment
to give you independent advice on your enamelling plant—
J. TEISEN, C.E., Furnace Engineer, Eckersall Road, Kings Norton, Birmingham

THE ERITH RANGE OF SANDS
Combine a variety of selected LOAMS and SILICA SANDS of guaranteed quality, suitable for every appropriate foundry requirement. In all fundamental respects they are the outstanding sands for present-day practice, and are tried and proved by performance and results.
Write for illustrated Brochure and Free Samples to: ESTABLISHED 180
J. PARISH & CO., ERITH, KENT Telephone No.: ERITH 20

A National Duty

For Protection—

PRESOMET

RUST-RESISTING PAINT

PRESOMET is a smooth-working bituminous black paint for use on all metal. Low in first cost and economical in use. It is also largely used on exterior woodwork where a black finish is desired.

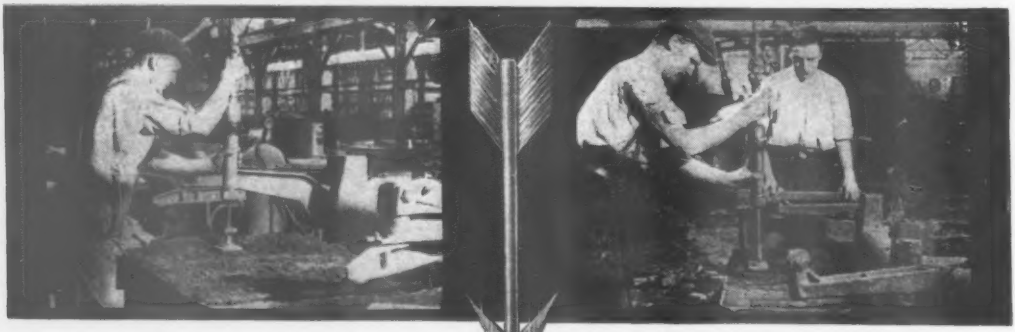
Full particulars from the Manufacturers :—

POWELL DUFFRYN Associated Collieries Ltd.,

By-Products Dept., 115v, BUTE STREET, CARDIFF.

Telephone: Cardiff 8750

X49-402



Better Moulding means Better Castings

Quicker Moulding means More Castings

—And Holman Pneumatic Rammers mean Better & Quicker Moulding

Photographs by courtesy of Westinghouse Brake & Signal Co., Ltd.

Phone: Camborne 2275

HOLMAN BROS. LTD.

Grams: "Airdrill-Camborne"

CAMBORNE ENGLAND

SERVICE ENGINEERS IN ALL PARTS

FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 69 Thursday, April 1, 1943 No. 1389

Foundry Education in America

We have often noticed with considerable interest that not only are the problems affecting the foundry industry international in their incidence, but are often contemporaneous. Thus at the moment the British foundry industry is deeply concerned with the recruitment of youth destined to become either skilled artisan or executive; so, too, across the Atlantic considerable thought is being devoted to the solution of the second of these problems. At the last conference of the American Foundrymen's Association, the members received a "Report on a Survey of Foundry Instruction in Engineering Schools," and discussed two Papers on cognate subjects. One was by Mr. C. J. Freund on "The College Graduate Looks at the Foundry Industry," and the second, by Mr. S. D. Moxley, on "Engineering Graduates in the Foundry." The Report took the form of a *questionnaire* which was sent out to 140 schools. Of these, 85 sent no reply, 20 had organised no foundry courses, and only 35 gave detailed replies. From a study of the Report it appears that in 31 schools the students taking a mechanical engineering course are obliged to study foundry practice as part of their curriculum, whilst in others this subject must be followed by electrical, chemical, aero, petroleum and metallurgical engineering students. Because of this, in 1940-41 some 5,880 undergraduates were at least getting a nodding acquaintance with foundry practice, but of these only 34 graduates actually entered the industry. This was a distinct improvement, as the previous five years only furnished 26. Obviously, the figures are incomplete, as it is authoritatively stated that the foundry industry is America's fourth largest. The conclusions reached by the Committee making the Report are as follow:—

The Department of Mechanical Engineering in most schools teaches foundry practice, and opportunities should be afforded the teaching staff to study the metallurgical aspects. There are many schools where the number of students per instructor is too great. There is too much emphasis placed on moulding, core-making and making castings instead of on the science or technology of foundry practice. There is still room in most schools for more men of faculty rank to teach foundry work. It would be advisable for more staff members to participate in research and consulting activities.

A survey should be made in each school to see if all required to take foundry courses actually need to. The appearance of many courses in advanced foundry practice is encouraging. The Committee feels there are still too few graduates in the foundry industry. The attendance of the foundry instructors at regional and national meetings should be much improved.

The discussion, which followed the presentation of this and the related Papers, showed that, where three steps had been taken success was assured. The first thing was co-operation with the schools and very early application was made for the services of the students on graduation. The second was the selection for departmental service by a committee of five, and the third a real personal interest in each "apprentice"—using the word quite loosely—until he is appointed to an executive position. The problem which remained unanswered was how to "sell" the foundry industry to the general public as one offering an attractive career for American youth. However, over a long period very close collaboration with the universities and technical colleges will go far to establish the desired result.

Contents

Foundry Education in America, 255.—Correspondence, 256.—Institute of British Foundrymen, 256.—Prospects of Water-Cooled Moulds, 256.—Foundry Technique in Relation to Certain Pressure Castings, 257.—Non-Concentration of Iron-foundries, 260.—Moulding Sands and Materials, 261.—Fixing Patterns on Plates, 267.—Law Cases, 268.—David Brown & Sons (Huddersfield), 268.—Workmen's Compensation Act, 1943, 269.—Australian Industries, 269.—The National Stock List, 270.—New Restrictions on Business Use of Paper, 270.—Combined Aluminium Committee, 270.—News in Brief, 272.—Personal, 272.—Wages in Engineering, 272.—Iron and Steel Scrap Control, 272.—Obituary, 272.—Silicosis Among Foundry Workers, 274.—Contracts Open, 274.—Raw Material Markets, 276.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

MELTING FURNACE ECONOMY

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I felt I must reply to Mr. Logan's interesting letter with reference to the above in your issue of March 11, 1943, as Mr. Logan's statement that 99 out of every 100 natural-draft furnaces are hopelessly inefficient, apparently makes the figures sent in by me recently the only natural-draft furnaces left in the country which are efficient. He also mentions that *if we accept the fact* an average fuel ratio for a correctly run forced-draft furnace should be 1:4½ or 1:5.

I would say, in reply to this, that there is no need for the statement *if we accept*, because it has got to be accepted, as it is a fact which can be seen in the writer's works at any time on any day. If Mr. Logan cares to contact me, I shall be pleased to show him these results, and if he sees same with his own eyes he has got to accept it as a fact; hence my statement that the sweeping claim made about natural-draft furnaces being out of date is an incorrect one and likely to lead to confusion. I have seen many natural-draft furnaces which are not good, but it is not always, in my view, good policy to blow these up with a fan, because the crucibles do not always give the best life under local hot conditions. I know many forced-draft plants which are not getting the average number of heats from crucibles that many people get with natural draft, and crucibles these days, as in peace days, require looking after very carefully, as the cost of brass castings can go up very much in cases where crucibles do not give the life they should do.

The plant referred to has a battery of 38 pit fire furnaces, each of which will melt 400 lbs. of metal, on the same flues to the chimneys, also two air furnaces of 3½ tons capacity for the melting of gunmetal. There are two chimneys attached to the same flue line of good capacity, and this I agree is the reason such a low fuel consumption is obtained. Other plants could be made on similar lines. In this battery of natural-draft crucible furnaces manganese brass can be melted. Of this there are various qualities, some going up to 50 tons U.T.S. value, with 12 to 16 per cent. elongation, and the losses in melting on these high-zinc alloys are excellent; so are the gunmetal alloys, phosphor bronze, etc.

I mention this to add to Mr. Logan's remarks concerning losses in the Sklenar furnaces, two of which are operated here. In the melting of high-zinc alloys in these furnaces, a hopeless result as to metal losses is obtained, and I would not advise anyone to use such a furnace where the melting of high-zinc alloys is concerned. In fact, I think the Sklenar furnace was only envisaged for the melting of low-zinc alloys, which to some extent tells against its usefulness as against crucibles, but for the melting of gunmetal we have hundreds of loss figures which are not in excess of 0.75 per cent.

I am sure Mr. Logan is correct as regards quality of metal from crucibles as against other types of plant, but I think he makes a strong claim when he emphasises that the day of the natural-draft crucible furnaces is over. I personally do not know of another furnace of any type which has a lower fuel consumption than the natural-draft crucible plant referred to, which is working every day in the week, including Sunday, and I am certain that neither he nor anyone else can mention a furnace which can beat such furnaces either for speed, quality or fuel consumption; so why make such a sweeping statement that their days are over?—Yours, etc.,

W. MACHIN.

Lancashire.
March 25, 1943.

INSTITUTE OF BRITISH FOUNDRYMEN

WEST YORKS BRANCH

The annual general meeting and election of officers of the West Yorks Branch will be held at the Technical College, Bradford, on Saturday, April 3, 1943, at 6.30 p.m. The Branch Council will meet at 5.45 p.m.

The prizes awarded to the authors of successful Papers in connection with the recent "Short Paper Competition" promoted by the Branch will be presented as follow:—

1st Prize.—Mr. J. W. Nicholls, for his Paper on "Hints on Founding Low-Carbon Cast Iron."

2nd Prize.—Mr. W. Jones, for his Paper on "The Introduction of Female Labour into the Foundry."

3rd Prize.—Mr. R. Oldershaw, for his Paper on "The Training of the Foundry Apprentice."

PROSPECTS OF WATER-COOLED MOULDS

Plans for the use of water-cooled moulds in the steel industry, both for casting individual ingots and for continuous ingot casting, were delayed last year in the United States, because of the concentration on the manufacture of war materials, but in the non-ferrous industry the use of water-cooled moulds for both purposes has greatly expanded during the year, reports E. R. WILLIAMS, of the Vulcan Mold & Iron Company, in a 1942 review of progress in "Steel." A large quantity of aluminium, copper, and brass is currently being cast both in individual water-cooled moulds and in continuous casting equipment. Construction of a unit for continuously casting steel ingots by one of the large steel companies is nearing completion, and operations will be started shortly. This unit marks the beginning of continuous casting in the steel industry, and with the probability that many improvements will be made by it in the technique of steel casting, it appears that 1943 will witness the rapidly expanded use of continuous casting in both the steel and non-ferrous industries, he suggests.

FOUNDRY TECHNIQUE IN RELATION TO CERTAIN PRESSURE CASTINGS

Discussion of paper by the Lancashire Branch of the Institute of British Foundrymen

By F. DUNLEAVY

(Continued from page 244)

Foundry Technique

MR. R. S. TURNER (Manchester) said that the type of castings described by Mr. Dunleavy were certainly very difficult to produce. Every credit was due to him for having mastered the problems which had to be solved. The castings appeared to be better if they were run fast, and the manganese content was stated to be approximately 0.7 per cent. in the cylinder and crankcase illustrated. In his (the speaker's) experience, in order to avoid dross on castings, the manganese content could be increased to 1 per cent. and the casting would be improved. He understood Mr. Dunleavy to say that he had ten 2-in. risers on the boiler feed pump casing. Were they for the purpose of feeding the casting, or merely as outlets to avoid air locks? He had very great pleasure in proposing that a hearty vote of thanks be accorded to Mr. Dunleavy for his most instructive and interesting Paper.

MR. W. TAYLOR (Manchester), in seconding, congratulated Mr. Dunleavy upon his effort, and remarked upon the excellence of the screen illustrations; they had only to be seen to be appreciated.

The vote of thanks was carried unanimously by acclamation.

MR. DUNLEAVY, in responding, wished it to be understood that the work described in the Paper had been done throughout entirely with the full co-operation of the whole of the staff of the foundry, and was not the result of mere individual effort alone. Whenever trouble was experienced, the fact was made known generally and it was usually the case that someone could give the clue to the cause. Advice from any person was of course invaluable. Periodical meetings were held in the foundry for the purpose of discussing and endeavouring to arrive at a solution of difficult problems. The foundry did not have any more scrap than anyone else, although the scrap percentages were still too high, but its personnel did try to be honest and frank, admitting the existence of a difficulty whenever they were confronted with one.

He had not tried the 1 per cent. manganese referred to by Mr. Turner, and 0.7 per cent. was about the maximum. The ten risers need not be considered too much as feeders except on top rib. The point was that there was some real fluid metal coming through the risers. There had been difficulty through the varying sections and an attempt was made to equalise the rate of cooling. A proprietory dressing was used on the bottom part of the mould in order to stop scouring, and it was desired that the metal should run fluidly into it through the risers. The risers on the rib were very effective, but on the flange their use was questionable.

DISCUSSION

MR. E. LONGDEN (Manchester) said the point for consideration was how much the foundry organisation was effectively and wisely controlled, because difficulties were bound to occur from time to time. For instance, there was often less scrap from a machine-made mould, because a more or less foolproof method of casting could be adopted. The size of the downgate could be determined in relation to the ingate, as well as the volume of the feeders on the job, etc.; nevertheless difficulties would be experienced. Even then there was probably less scrap than in the case of jobbing moulding. It was desirable that a record should be kept of the method of core-making and the moulding of important castings, and that the patterns should be marked as to the position of ingates, feeders, etc. The class of work described in the Paper involved real craftsmanship, and men had to be trained to do it. There had been very little said regarding the metallurgical point of view.

Running an Evaporator Body

A point which occurred to him was with regard to the running of the gunmetal evaporator body. Dealing with the multiple series of runners on this particular casting, it was noticeable that there was one single runner from which two separate ingates issued at two different joints. Was this correct practice? If so, why was it not better for the main downgate leading to the first joint to drop down to the second one rather than step it, and for the main first downgate to be smaller than the second one, so that there was no danger of metal flowing over into the second series of ingates on the top joint? One might get along with this practice for a very long time, but the moulder may have been taught to use a certain area of downgate and then find he is using ¼ in. less in diameter, or width, or both, and trouble results. Possibly, if the main downgate was smaller than the one falling through to the bottom joint, there would be no danger of metal actually flowing into the top gates before it should. Dealing with the occurrence of patches of trouble, this very often arose owing to the filthy condition of the runner-gate system.

MR. DUNLEAVY said that a job was not given to a man in the foundry with instructions to run one- or six-off or 12-off. His instructions were how to make it, and it was seen that those instructions were carried out. It was often the case that a job was given out, and the first two moulds or sets of cores were made, and then something went wrong. Perhaps an instruction was not carried out. He did not wish for a moment to be thought to be congratulating himself upon a small scrap percentage. The scrap percent-

Founding of Pressure Castings

ages were still too high, but an attempt was made to face troubles frankly and fearlessly.

Multiple Pump Castings

In the multiple pumps described, the down-runners and ingates were made as foolproof as possible. That was because the human element simply failed, on repetition, to reproduce the same size of down-runners, ingates and risers. He thought he had shown in the illustration of multiple casings that there was no possibility of any filthy patches occurring through blacking, owing to the rigid system of checking instituted. A block was made in order to form the runner box, and the size of the box was standardised and the possibility of error thereby eliminated. Actually, after the early teething troubles with this job being overcome, a large number of castings were made before there was any trouble, so that personal experience of troubles with these castings, apart from material, showed they were mainly due to wear and tear of equipment. The main point to be observed was, if there were any trouble occurring, to ascertain its cause, otherwise the procedure was very much like running round and round in a circle. If the cause were ascertained, then a remedy could always be applied.

Evaporator Castings

The difficulty with the runners on the gunmetal evaporator body was that all the time the metal was going through the mould there was a chilling effect from the core and from the mould. It was not a job which could be cored up in an hour or so. There were a number of jib cranes in that particular section of the foundry, but even then there was much setting done to make sure everything was correct. A casting of this description which was ¼ in. out of truth was scrapped without the slightest hesitation. The metal was required to be in the mould as quickly as possible, in order to ensure there was no short run. It was considered that, as long as a head of metal could be maintained in the box, and all the dross was at the top of the runner box, the casting would be quite clean.

Impeller Cores

MR. A. SUTCLIFFE (Bolton) referred to an illustration of an impeller core for pump castings in non-ferrous or cast iron, which was approximately 18 in. dia. He stated that it was very easy to cradle such cores, or any shape of core, provided they could be stripped from the corebox. All that was necessary was a square or a round frame fitted with damped black sand, put through a sieve or quarter-inch riddle. Did Mr. Dunleavy use damped sea sand?

MR. DUNLEAVY replied in the affirmative.

MR. SUTCLIFFE said that in that case some of the oil would be absorbed in the wet sea sand used for the cradling of such a core. Was the oil sand milled?

MR. DUNLEAVY answered that it was mixed but not milled. It was mixed in the mixer, and the proportion of core oil was 28 sea sand to 1 of oil.

MR. SUTCLIFFE remarked he used a formula for core oil up to 80 to 1 for such cores, in a thin oil-sand mixing.

MR. SUTCLIFFE then referred to the method of running the gunmetal evaporator body, and then drew a diagrammatic sketch on the blackboard, which showed that any metal running into the mould from the top inlet runners and staying on top of some cores in the mould, would be set when the metal began to rise in the mould from the bottom inlets.

Design and Method

MR. DUNLEAVY, referring to the down-runners on the gunmetal evaporator body, said that Mr. Sutcliffe had evidently missed the point; two down-runners were used, but one had been broken off from the top joint. Usually evaporator bodies were made with a hole through the opposite end to the large print. In this case it was a blank end, and that was the difficulty. Another danger was scouring. This was overcome by arranging a piece of loam cake at the bottom of each down-runner. The other point was that to step the down-runners the flow of the metal was broken; unless this flow was broken there was a tendency to scour. The metal was proceeding at great speed. There were two down-runners on the job; one on each side. It was a matter of lifting the plugs as quickly as possible. It was essential to get the metal in quickly, because of the chilling action going on all the while the metal was going through the mould.

When this job is being cast the large runner box is filled. Then both loamed plugs are lifted together, so that there is the dross from ladle, etc., still on top of the metal remaining in the runner box after the mould is filled, so that there is no possibility of dross entering the mould. The runners and ingates sketched by Mr. Sutcliffe may be satisfactory in an ordinary mould, but evidently what he has overlooked is that this casting in gunmetal is 3 ft. by 3 ft. 6 in. by 3 ft. deep, the metal thickness being $\frac{5}{8}$ in. The whole aim was that the casting should pass the hydraulic test satisfactorily. Perhaps the main point was that these castings were subjected to hydraulic pressure tests. The method of running suggested by Mr. Sutcliffe would not be satisfactory.

He thought the statement that metal would enter the top inlets before entering the bottom inlets did not appear to matter to a very great extent, even if it were true, because with two 2½ sq. in. down-runners the metal filled the mould too rapidly to have any injurious effect.

Oil-Sand Proportions

MR. J. MASTERS (Shrewsbury) understood Mr. Sutcliffe's question about oil content to refer to impeller cores. Mr. Dunleavy gave a ratio of 28 to 1, which, in his opinion, was a waste of oil. It should be quite safe to work with a mixture of 80 to 1 with a straight linseed oil or one of a similar character provided the mixing was done properly by weight. It was essential to indicate whether to mix by weight

or by volume, because specific gravities were quite different. By reducing the oil content the drying time was reduced, and there was less tendency to distortion. In the case of an underdraw core there would be such a vast volume of gas that holes would occur. Having ascertained from the lecturer that the moisture content in the mould facing sand was 6.5 to 7 per cent., the speaker insisted that this was courting trouble. One firm had cast 400 of that particular type of casting, but the moisture content never exceeded 4 per cent., while the new sand content in the facing sand was less than 20 per cent. Seeing that such a large quantity of impeller castings was made, was it not found that the use of sea sand was detrimental to the cores. There seemed to be a waste of sea sand. Some firms packed the cores with wet sea sand, but later reused the sand to make cores. Referring to the gunmetal evaporator body, he would certainly advise that all down-runners for castings of this description should be blacked. He noticed from the slides that it looked as though the metal had eaten in.

Loam Brick Walls

The lecturer had stated that in the case of the loam job he had built a double wall. Was it an 18-in. wall?

MR. DUNLEAVY said there were too or three courses on the lifting plate with double brick; a brick and a half to half way up, and then single bricking to the top.

MR. MASTERS said he had often made pans which had to be turned over with a 9-in. wall, and the casting weighed 15 tons. A circular wall could be built. What was running through his mind was the thought of the tremendous amount of easing time necessary, and what a big job there was for the men doing the easing. A 9-in. circular wall would never burst inwards. He had never seen one burst, and he had seen thousands of tons cast.

Evaporator Body Core Assembly

Mention had been made concerning the assembly of the cores in the evaporator moulds, and a doubt expressed as to their action in chilling the metal. Would it not be advisable in a case where the casting was of such a character and of such an expense to assemble it at the mould, do all that was necessary, and then put it back in the stove, and heat it up for a couple of hours? This would reduce the liability to chilling, and any moisture that might be used in the making up of the cores would have a chance of being driven out. This plan would seem to make for a much safer job.

MR. DUNLEAVY said in answer to the first question, that the ratio of dry sea sand to proprietary core oil was 28 to 1 by weight. He had emphasised in the Paper that these methods were not necessarily the only method, neither did he claim it to be new, but is a description of existing practice, and he claimed it was sound practice, as proved by the results. He would not attempt to cast these very thin impellers with green sand. These moulds were dried, even with a cupolette iron, the tendency would be that the impeller tips would be hard to machine. The small ones were dried, as the metal section was only about $\frac{1}{8}$ in.

MR. MASTERS still insisted that with 6 per cent. moisture it was risky to cast green.

MR. DUNLEAVY, in reply, stated that even with a moisture content suggested by Mr. Masters of 4 per cent., castings of this type would still be hard on the shroud tips. One point that was evidently overlooked by Mr. Masters was the analysis of the materials used. A firm cannot carry irons or materials to suit every type of casting, and would suggest that in the production of castings that are subjected to pressure tests, it was better to confine the final compositions to minimum and maximum limits, and to adjust the foundry practice to suit.

Impeller Defects

He had experienced trouble with impellers, but the general trouble seemed to be blowing on the shroud. The blowing was referred to in the Paper, and was mainly due to the amount of trapped gases around the centre boss. The solution to this problem was also given; *id est* the inspector condemned them before they left the foundry floor. The answer to the question respecting linseed oil and the expensive core, seemed to be that wartime was the wrong time for making promiscuous experiments. The foundry management found that all their time was filled up in coping with their commitments and their everyday foundry problems, also that it was far better to trust the devil they knew than the one they did not, until we could get down, if required, to the question of cost, etc. Wet sea sand had been referred to. The point was that metal formers were not used for the impeller cores. There was no room space to stock all the metal formers that would be required. The methods suggested in the Paper are everyday practice on a type of casting, which was after all their bread and butter.

MR. MASTERS was referring to the instance with peculiar shaped sweeps on the vanes. It would cost more to add sand half a dozen times than to make a cradle.

MR. DUNLEAVY, in reply, stated that these types of impellers were made in segments. The sweep of the vanes was always varying, on account of the different customers' requirements. This type of core is usually packed with black sand, but the general practice is to use wet sea sand. He again referred to the 18-in. wall, and added that there would only be a 9-in. wall even with a brick and a half, owing to the thickness of the interior facings, etc. The photographs were not complete for the purpose of showing the inside of the evaporator body, but actually a double brick was essential initially in order to provide an adequate foundation. This part of the wall was only about 8 or 9 in. high.

Dealing with the assembly of the cores in the gunmetal evaporator body and the chilling effect of the moisture from the joint of the cores, the body core was jointed and dried before it was placed in the mould, so there was no chilling from that joint, but there was a serious chilling area over the mould and the core, although both mould and cores were warm when coring up commenced.

Founding of Pressure Castings

Core Reinforcement

MR. HAROLD HAYNES (Ashton-under-Lyne) was interested in the illustration of the loam casting. Good results could be obtained by this practice, but the moulders must be skilled. He thought Mr. Dunleavy must possess some knack of sweeping to strike a core so accurately from a 2-in. spindle without any shaft or gauge or anything else to work in at the top as well as the bottom. Had Mr. Dunleavy tried easing bars or iron wedges in these cores?

MR. DUNLEAVY said his firm had some exceptionally good moulders for the type of work described. All the work done was the result of the team spirit; there was no question of the waving of a magic wand. The bulk of the work on this core and mould was formed by a split frame. The only portions swept up were the print and bottom flange, the back portion of the casting and the head. The use of the iron wedge referred to was quite common practice, but some of the castings were so shaped that it was difficult to use easing bars. They were let in, in sections. The strain was outwards on the mould, rather than inwards, but the grids and strengthening post prevented any deleterious action.

Replying to Mr. E. Jackson (Oldham), MR. DUNLEAVY said that they did not make impeller castings in manganese bronze. His company made impellers in grey and alloy irons, Monel and most of the copper-base alloys. Some of these castings would be a difficult proposition in manganese bronze. If Mr. Jackson was interested, the author would advise him later in regard to a manganese bronze that would probably suit his purpose.

Sandslingers

Towards the close of the meeting a discussion arose as to the merits and demerits of electrically operated sandslingers in connection with foundry practice. The consensus of opinion was in favour of their use, but that it should be borne in mind, owing to the presence of so much sand in the foundry, there was bound to be much wearing or abrasion of the working parts of the apparatus, and that the user must reconcile himself to the idea that a replacement of such parts would have to be taken into consideration from the point of view of efficient maintenance. The mechanical construction of the sandslinger was good and the major part of any trouble experienced would probably be with its electrical equipment. If a breakdown occurred an electrician could probably patch it up for the time being and effect a full repair at the week-end.

It was pointed out that the main cause of mechanical breakdowns was the accumulation of tramp iron, which found its way through the head. If the sand, before entering the hopper, was passed over a magnetic pulley, much of this trouble would be eliminated. Various other forms of sandslingers were also mentioned, the general opinion being in favour of their use.

The proceedings then concluded.

NON-CONCENTRATION OF IRON-FOUNDRIES

The abandonment of the Board of Trade's plans for the concentration of ironfoundries has been mainly due to the representations made by, and activities of, the Council of Ironfoundry Association through its Main Concentration Committee.

At a meeting held in London by the Council (C.F.A.), on December 8 last, a resolution was passed instructing the Main Concentration Committee to interview the President of the Board of Trade and place before him facts showing that concentration was not yielding the results that had been expected in those areas where investigations had already taken place, and that no promise of better results was given in the preliminary investigations made in other areas then being dealt with.

Acting on these instructions, the Main Concentration Committee of the C.F.A. appointed a deputation, which met the Parliamentary Secretary to the Board of Trade on January 26. As a result of this interview, the Council was later notified by the Board of Trade that, after consultation with all the departments concerned, it had been agreed to abandon any further regional concentration of ironfoundries by nomination.

In its statement the Board of Trade drew attention to the fact that this arrangement implied that ironfoundries will not enjoy protection from requisitioning of premises and labour withdrawals, as was afforded by nucleus certificates, nor would the benefits of the Finance Act, 1941, be available in the event of any industry-wide compensation scheme that might be set up at a later date. The Board of Trade expressed its willingness to consider voluntary plans submitted to it by small groups of ironfounders, and when these voluntary schemes are approved in consultation with the interested departments, nucleus certificates would be issued to the open firms.

With regard to those parts of the London and South Eastern Region where concentration has already been effected, the existing scheme will remain in operation. The C.F.A. Main Concentration Committee will shortly investigate the question of voluntary concentration schemes, and a local concentration committee has been set up by the C.F.A. in order to investigate the position in the London and South Eastern Region.

The important decision taken by the Board of Trade reflects the very strong case that had been put up by the Council and emphasises the achievements that can be obtained and the recognition that has been gained by the industry, thanks to organised action through the medium of the Council.

Coke Economy in Foundries.—G. Sulliotti, in the Italian journal "Ingegnere," calls attention to the urgent need for economising in coke in Italian foundries, and proposes several means for such economy on the basis ofv an examination of the combustion phenomena in the cupola.

MOULDING SANDS AND MATERIALS

SECOND REPORT OF THE MOULDING MATERIALS SUB-COMMITTEE OF THE STEEL CASTINGS RESEARCH COMMITTEE

Section III.—Part 2: Clays other than fuller's earth: Composition, properties and foundry applications

(*Continued from page* 227)

PART 2—REPORT ON CLAYS OTHER THAN FULLER'S EARTH

A considerable number of clays have been fully investigated, and the trials show that some of them, selected ball clays in particular, when used in proportions of 5 to 10 per cent. with a silica sand, give satisfactory green strength, but are lower in dry strength than normal Fulbond or bentonite mixtures. The kaolinite-clay-bonded sands have a greater hot strength than the Fulbond or bentonite mixtures, and in some branches of foundry work this is a definite advantage.

The fundamental investigation of the characteristics of bond clays and of the mechanism of bonding is continuing; the results obtained confirm the superior bonding power of clays of the montmorillonite type. Apart from the fuller's earths, the only clays occurring in Britain so far found to contain much montmorillonite are those occurring in the London Clay measures, but they also contain a high proportion of siliceous silt, which lowers their bonding power. The bond strength, dry-strength/green-strength ratio, and range of retention of green strength with increasing moisture content of these montmorillonite-containing materials varies directly with their montmorillonite content. An interesting example of the occurrence of montmorillonite is in a silty clay which is recovered from the washing of the sand used for sand-lime brickmaking at Sevenoaks, Kent. This reclaimed clay has useful bonding power, but its montmorillonite content is too low to put it into the fuller's-earth class.

TABLE XII.—*Mechanical Tests on Mixtures with Arnold's No.* 52 *Sand as Base.*

Sample No.	Composition of Mixture	Weight of Test-pieces. G.	Moisture. %	A.F.A. Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength, Lb. per sq. in., dried at—	
						200° C.	400° C.
1	6% Colbond 94% Arnold's No. 52.	160	2·4	420	3·5	61	62
2	5% Colbond 1% Bentonite 94% Arnold's No. 52.	160	2·6	420	5·1	90	103
3	6% Fuller's earth 94% Arnold's No. 52.	160	3·6	380	7·2	91	99
4	3% Fuller's earth 97% Arnold's No. 52.	165	2·6	450	3·5	36	40
5	3% Bentonite 97% Arnold's No. 52.	157	2·7	430	3·3	66	61

The following records of experimental investigations and practical trials cover a number of alternative bond materials, which have been examined by the members of the Sub-Committee.

Colbond

This is a finely ground plastic clay imported from Eire. It is a useful material, giving good moulding properties to the sand. Comparison of the properties of sand mixtures made up with Arnold's No. 52 sand, bentonite, fuller's earth and Colbond are shown in Table XII.

Sintering Characters.—A.F.A. test-pieces all fired together to 1,500 deg. C., had the characteristics stated in Table XIII. Samples 3, 4 and 5 showed cracks after firing, so that the high apparent expansion is due mainly to the occurrence of cracks. The refractoriness under reducing conditions of Colbond in comparison with fuller's earth and bentonite is as follows: Colbond, 1,565 to 1,620 deg. C.; fuller's earth (Fulbond No. 2), 1,290 deg. C.; bentonite, 1,405 to 1,440 deg. C. It is interesting to note the low refractoriness of the two latter. In spite of this, the crushing strength of the test-pieces fired at 1,500 deg. C. is not unduly high. Further information relating to the properties of Colbond is given below, in the discussion of the properties of Kingscliffe and Sandhurst clays.

TABLE XIII.—*Character of Sintered Test-Pieces, after Firing at* 1,500 *deg.* C.

Sample No.	Composition of Mixture.	Expansion after Firing.			Crushing Strength when Cold. Lb. per sq. in.
		Diameter. In.	Length. In.	Volume Increase. %	
1	6% Colbond + 94% Arnold's No. 52.	0·07	0·08	11·1	175
3	6% Fuller's earth + 94% Arnold's No. 52.	0·20	0·19	33·0	300
4	3% Fuller's earth + 97% Arnold's No. 52.	0·16	0·14	27·0	170
5	3% Bentonite + 97% Arnold's No. 52.	0·11	0·12	17·8	140

Compared with fuller's earth, Colbond is more refractory, but its relative value as a bond in the green state is about one-half that of fuller's earth, *i.e.*, about twice as much Colbond is necessary to give the required workability to the moulding sand. Unless the proportion of Colbond used is high there is a tendency to friability on drying, but this can be corrected by the addition of an organic bond such as G. B. Kordek. This friability is also reduced if a proportion of fuller's earth or bentonite, varying from

Moulding Sands and Materials

one-tenth to one-fifth of the weight of Colbond used, is added to the mixture.

Benbond

This is a finely ground plastic clay prepared from a deposit in Essex. In general properties as a bond it is comparable with Colbond, and in foundry-sand mixtures it behaves in much the same way. The chemical analysis of the clay is as follows: SiO_2, 57.2; Fe_2O_3, 7.15; Al_2O_3, 18.41; CaO, 3.1; MgO, 2.24; and loss on ignition, 10.5 per cent. Mechanical analysis gave the following results: Sand grade, 1.4 per cent.; silt grade, 36.4 per cent.; clay grade, 62.2 per cent.

TABLE XIV.—*Properties of Silica-Sand/Benbond Mixtures.*

Composition of Mixture. %. Sand.	Benbond.	Water. %	A.F.A. Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength, dried at 110° C. for 1 hr. Lb. per sq. in.	Remarks.
King's Lynn Red.						
96	5	3·4	143	6·3	29	All milled for 15 min.; not plastic and not suitable for moulding.
94	6	3·5	139	8·2	29	
93	7	4·2	138	7·7	35	
92	8	4·3	137	9·3	39	
92	8	5·3	125	5·8	67	
Shellard.						
94	6	3·0	144	7·2	31	All milled for 10 min. Suitable for moulding.
94	6	4·0	133	4·5	32	
93	7	3·9	125	9·8	32°	
93	7	4·2	120	5·7	56°	
92	8	3·0	120	11·1	32	
92	8	4·1	118	7·6	59°	
91	9	3·0	105	13·1	43°	
91	9	4·0	96	9·1	68°	
90	10	3·0	99	15·5	48°	
90	10	4·0	90	10·5	70°	
Leighton Buzzard No. 9.						
92	8	3·5	250	13·0	35	Milled for 10 min.; mould well.
King's Lynn Red.						
92	8	4·0	170	12·4	48	
92	8	4·0	137	9·7	91	Too wet.

Milled in a laboratory mill with various silica sands in different percentages, and at different water contents, the properties of the sand mixtures are shown in Table XIV. The indications are that a clay content of 7 per cent. should prove adequate for normal green-sand purposes.

Distribond, etc.

In discussing a range of clays containing various proportions of bentonite, it is appropriate at this stage to indicate a series of X-ray studies which have been applied to this group of materials, as well as to bentonite and the fuller's earth materials. Recent X-ray studies, summarised by Partridge, have shown that there are two groups of clays. One contains about 40 per cent. of alumina and is of the kaolin type ($Al_2O_3.2SiO_2.2H_2O$); the other contains a higher proportion of silica to alumina, and is represented by the structure of pyrophyllite and montmorillonite ($Al_2O_3.4SiO_2.nH_2O$). These clays are built up of layers of hydrated silica and alumina. The structure of the individual layers is the same, and the difference between the clays lies in the order and relative proportions in which the layers are piled one on top of the other, and in the sideways shifts of the layers or of the atoms in the layers to produce a position of minimum potential energy.

When water is added to montmorillonite it is absorbed in the form of sheets of water molecules between the sheets of the oxygen atoms of the silica layers, thus lengthening the *c* axis of the crystal, the other axes remaining unchanged. It has been suggested, however, that only the first four molecules of water enter the cell in this way and the remainder becomes attached to the exterior oxygen surfaces of the particles of clay. This water becomes attached to the clay particle and fits into the crystal structure, but the looseness of the attachment allows easy movement of the particles, thus conferring the property of plasticity.

TABLE XV.—*Constituents of Various Bonding Materials.*

Bonding Material.	Mineralogical Constitution.			
	Montmorillonite.	Kaolinite.	Quartz.	Calcite.
Wyoming bentonite	Large amount.	...	Medium amount.	...
Fulbond	Medium amount	...	...	Medium amount
Distribond No. 1	Small amount	...	Large amount	...
Distribond No. 2	Small amount	...	Medium/large	Medium amount
"English Clays" Nos. 1 and 2.	Small amount	Medium/large	Medium/large	...
"English Clays" Nos 3 and 4.	...	Medium/large	Medium/large	Small amount

The montmorillonite clay develops greater plasticity and bonding strength when mixed with water than the kaolin type of clay. This has been proved in green-sand foundry practice, where bentonite, which consists largely of montmorillonite, has excelled other bonding clays of the kaolin type.

It was considered that an X-ray examination of the various bentonite substitutes would be of interest. X-ray powder photographs were made, and the constitutions of the various bonding materials are summarised in Table XV. In the X-ray photographs the calcite and quartz lines are sharper than those given by montmorillonite, so that the proportions of calcite and quartz appear higher than they really are.

It is evident from the results in Table XV, that Distribond No. 1 is a siliceous clay containing bentonite, while Distribond No. 2 is a siliceous clay mixed with another clay containing montmorillonite. "English clays" Nos. 1 and 2 are mixtures of china clay and bentonite, and "English clays" Nos. 3 and 4 are mixtures of china clay and Fulbond. The amount of kaolinite in Distribond No. 1 and the amount of montmorillonite in "English clays" Nos. 3 and 4 are below the visibility limit of the X-ray. The large amounts of quartz and calcite present in the various substances do not develop plasticity and may

be regarded as diluents. Comparative tests on Distribond-sand mixtures are given in Table XVI.

English Clays, Lovering, Pochin & Company, Limited

The chemical analysis of the four clays is as follows:—

	No. 1.	No. 2.	No. 3.	No. 4.
SiO_2. Per cent. ..	55.32	55.92	55.32	54.64
Fe_2O_3. Per cent. ..	1.14	1.29	1.57	2.0
Al_2O_3. Per cent. ..	31.34	30.47	30.63	28.45
CaO. Per cent. ..	0.16	0.16	0.48	2.10
MgO. Per cent. ..	0.58	0.69	0.65	1.05
Loss on ignition. Per cent.	10.15	9.73	10.0	11.04

No. 4 has a higher content of iron oxide, lime and magnesia than the other clays. This is probably connected with its better behaviour, as shown below. Trials of mixtures containing 6, 8 and 10 per cent. of the ball clay with Chelford silica sand as base were made. It was found that 6 per cent. of clay gave mixtures which were too lean, and 10 per cent. gave sticky mixtures. The mixtures containing 8 per cent. of ball clay gave the results recorded in Table XVII.

The data show that a mixture of Chelford sand and clay No. 4 adequately milled and containing 3-3.5 per cent. of water could be used for making a variety of foundry moulds. The content of clay can be reduced to 7 per cent. and still give good results, as shown in Table XVIII, using Arnold's No. 52 as the base sand. The relative sintering characteristics are indicated by the compressive tests carried out on samples fired at temperatures up to 1,600 deg. C.

A practical foundry trial with 7 per cent. mixtures of Fulbond No. 1A, "English Clay" No. 2 and "English Clay" No. 4 on a 0.40 per cent. carbon steel, showed no appreciable difference in the stripping properties of these three materials.

Kingscliffe and Sandhurst Clays

These materials have been compared with Colbond in the series of tests recorded in Table XIX. The mixtures were ground in a laboratory mill. The test-pieces were dried at 200 deg. C. for 1 hr. Mixtures 2 and 4 are plastic and should be successful in the foundry. Kingscliffe is a leaner clay and does not give plastic mixtures. Its very high ratio of dry

TABLE XVI.—*Comparative Tests on Distribond Nos.* 1 *and* 2, *Bentonite and Fulbond.*

	100 per cent. Chelford + Bentonite.			100 per cent. Chelford + Fulbond.			100 per cent. Chelford + Distribond No. 1.			100 per cent. Chelford + Distribond No. 2.		
Bond. Per cent...	3.5	7	10	3.5	7	10	3.5	7	10	3.5	7	10
Moisture content per cent.	1.5	2.75	4.0	1.5	2.75	5.0	3.5	2.5	3.0	1.75	3.0	2.5
Green-Test Results.												
A.F.A. Tests.												
Ramming density	1.50	1.50	1.55	1.50	1.50	1.65	1.55	1.60	1.55	1.55	1.60	1.55
Compressive strength. Lb. per sq. in.	6.3	9.8	12.5	2.4	6.8	7.3	1.0	6.0	7.3	2.4	7.2	7.3
Permeability No.	250	167	120	204	167	107	250	150	167	214	165	177
B.C.I.R.A. Tests.												
Ramming density	1.6	1.6	1.75	1.6	1.6	1.75	1.6	1.6	1.6	1.6	1.6	1.6
Compressive strength. Lb. per sq. in.	6.75	10.5	17.0	1.75	7.0	8.75	2.0	6.5	9.0	3.0	9.0	9.5
Permeability No.	205	118	71	115	121	78	223	131	133	232	133	148
Dry-Test Results. Dried for 1 *hour at* 170 *deg. C.*												
A.F.A. shear strength. Lb. per sq. in.	30	48	55	31	46	33	31	39	47	30	34	36
B.C.I.R.A. compressive strength Lb. per sq. in.	120	210	472	120	150	421	123	132	181	115	130	140

Moulding Sands and Materials

strength to green strength, however, indicates that it might be worth adding to mixtures where high dry strength is advantageous.

High additions of Sandhurst bond were required before much green strength was obtained. This material is washed out of Biddulph sand, which suggests that it contains free silica, and its chemical analysis confirms this. The Kingscliffe clay is available in two varieties, white and yellow, both of which have been tested. The yellow variety is a little stronger as a bond than the white, but at least 15 per cent. of either of them is necessary to give sufficient green strength with an average base sand. An interesting feature of this bonding material, however, is the relatively high dry strength that it gives, and it may be useful as an addition to other bonding materials.

TABLE XVII.—*Mechanical Properties of "English-Clay"/Chelford-Silica-Sand Mixtures.*

Mixture: Clay, 8 per cent.; Sand, 92 per cent.

Mixture No.	Water. %	A.F.A. Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength.* Lb. per sq. in.	Remarks.
Clay No. 1.					
1A	2·45	84	13·3	21	Too dry.
1B	3·3	97	7·7	51	Not plastic; dried test-pieces had poor surface.
1C	3·8	100	5·0	60	Too wet.
Clay No. 2.					
2A	2·55	99	12·3	21	Same remarks as for No. 1 clay.
2B	3·55	100	6·2	52	
2C	4·2	95	3·8	62	
Clay No. 3.					
3A	2·55	105	11·5	28	Too dry.
3B	3·3	117	7·4	50	Better and somewhat plastic; simple type of mould practicable.
3C	4·1	99	3·8	83	Plastic, but too wet for green-sand moulding.
Clay No. 4.					
4A	2·5	118	11·6	44	Dry.
4B	2·65	111	11·3	59	
4C	2·95	112	9·5	84	Plastic, good adhesion.
4D	3·5	114	7·9	100	
4E	4·2	100	3·8	110	

* Dried for 2 hrs. at 200 deg. C.

Silklay

This is a finely ground plastic fireclay of high refractoriness. As a bond it is about equal to Colbond for green strength, but gives a lower dry strength. The addition of 10 per cent. of Fulbond No. 1 (or bentonite) to the clay used as a bond practically doubles the dry strength and also increases the green strength.

Siolite

This material in the ground form was received from the Buckland Sand & Silica Company, Reigate Heath, Reigate. Preliminary experiments showed that the material had not a very high green bonding value, and it was necessary to use 14 per cent. of it in order to obtain a mouldable mixture. The chemical analysis was: SiO_2, 77.2; Fe_2O_3, 7.15; Al_2O_3, 8.7; CaO, 0.4; MgO, 0.62, and loss on ignition, 5.07 per cent. Siolite is a mixture of clay with fine silica. It is not a substitute for bentonite, but is of the same nature as the Sandhurst clay and might have an application in the replacement of silica flour for closing moulds and similar purposes.

TABLE XVIII.—*Mechanical and Sintering Properties of Clay-Sand Mixtures with Arnold's No. 52.*

Sand Mixed with—	Moisture. %	Permeability No.	Green Strength. Lb. per sq. in.	Compressive Strength, Lb. per sq. in., after Firing at—					
				800° C.	400° C.	1200° C.	1400° C.	1450° C.	1600° C.
7% English Clay :									
No. 1 . .	3·2	410	5·0	103	80	Collapsed	20	...	260
No. 2 . .	3·3	390	5·2	98	78		45	...	270
No. 3 . .	2·8	420	4·7	50	50		100	...	700
No. 4 . .	3·2	380	5·5	57	49		...	770	550
5% Fulbond No. 1 .	4·2	470	5·6	73	52	93	230	...	300
7% Fulbond No. 1 .	3·8	390	6·9	91	...	180	...	360	370

Seconite

This is a finely ground plastic clay which in proportions not lower than 6 per cent. gives satisfactory green strength with an average sand, but dry test-pieces are friable. The Seconite-sand mixtures are lean and would probably not be satisfactory for general steel foundry use; their properties are, however, improved by the incorporation of a small proportion of Fulbond No. 1 (or bentonite).

TABLE XIX.—*Comparison of Kingscliffe and Sandhurst Clays as Bond.*

No.	Sand. Per cent.	Clay.* Per cent.	Bentonite. Per cent.	Water. Per cent.	Permeability No.	Green strength Lb. per sq. in.	Dry strength. Lb. per sq. in.
1	K.L. red 95	C, 5	—	3.4	143	6.5	43
2	K.L. red, 95	C, 5	1	3.7	158	7.9	58
3	Chelford, 95	C, 5	—	2.2	179	5.0	26
4	Chelford, 95	C, 5	1	2.2	185	8.5	39
5	Chelford, 85	K, 15	—	4.6	97	4.0	83
6	Chelford, 85	K, 15	0.5	4.7	97	5.0	120
7	Chelford, 85	K, 15	1	4.5	109	6.4	108
8	K.L. red, 75	S, 25	—	6.0	65	5.7	82
9	K.L. red. 85	S, 15	—	4.0	97	4.0	25
10	K.L. red, 85	S, 15	1	4.5	104	6.2	112

* C: Colbond. K: Kingscliffe. S: Sandhurst.

Beacon Bentonite Substitute

This is a finely ground clay which in proportions not lower than 6-8 per cent. with an average silica sand gives satisfactory green strength, but the mixtures are lean and become rather friable on drying. A straight mixture of this bond with a silica sand would not be suitable in general for green-sand castings, but would

be improved both in plasticity and surface hardness on drying by a small addition of Fulbond No. 1 (or bentonite).

Cummingbond

This is an intimate mixture of a finely ground fireclay with an organic bond of gum type. It gives a poor green strength with an average silica sand, at least 10 per cent. being necessary, but a fair dry strength. The air-drying of these mixtures is slow. It is suggested by the makers that this bond is especially suitable for revivifying spent sands, and the tests made suggest that it is the "gum" constituent mainly which gives it value for this purpose.

Sintering Tests

The tests on all the above bonding materials have included the firing for 2 hrs. at 1,550 deg. C. of test-pieces made from mixtures of the bond with Chelford sand and Leighton Buzzard sand in proportions sufficient to give a green strength of 5 to 7 lbs. per sq. in., the A.F.A. test-piece being rammed with 10 blows. With the less refractory bonds there was obvious sintering, but in no case was this such as would be likely to give trouble in casting.

White Clay from Spitewinter, Worrall, near Sheffield

After receipt the clay was air-dried and ground to pass through a No. 60 B.S. sieve. The clay was analysed and mixtures made with coarse- and with medium-grained silica sands. Chemical analysis of the material gave the following results, in which the refractoriness and shrinkage are included:—

	Sample dried at 105 deg. C. Per cent.	Fired sample. Per cent.
Silica	60.71	67.25
Alumina ..	19.84	21.97
Iron oxide ..	3.68	4.08
Titanic acid ..	1.08	1.20
Lime	0.15	0.17
Magnesia ..	1.08	1.20
Potassium oxide	2.44	2.72
Sodium oxide	1.24	1.37
Loss on ignition	9.71	—
	99.93	99.96

Refractoriness: Cone 18, 1,500 deg. C.

Shrinkage: Plastic to dry, 7.8 per cent. linear. Dry to 1,900 deg. C., 6.8 per cent. linear.

Mixtures of the clay with Arnold's 52 and with Chelford silica sand were milled in a laboratory mill. Subsequently test-pieces containing 7.5 and 10 per cent. of the clay with each of these sands were fired at 1,500 deg. C. They sintered to a hard product, but showed no fusion or deformation. The properties of the milled mixtures are given in Tables XX and XXI.

P.V.B. Ball Clay

A sample of this clay in the ground condition was received from English Clays, Lovering, Pochin, Limited. Tests were carried out on laboratory mixtures with different silica sands as base, using 5 per cent. of the P.V.B. ball clay. The results are shown in Table XXII, in which all the base sands mentioned have clean grains with the exception of K.L. red sand, which has a thin film of adherent clay.

TABLE XX.—*Spitewinter Clay with Arnold 52 Silica Sand.*

A.F.A. test cylinder 2 in. × 2 in.; number of blows, 3. Samples dried at 200 deg. C.

Clay. %.	Water. %.	Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength. Lb. per sq. in.
5	1·5	430	1·83	...
5	2·0	...	1·73	...
5	2·5	...	1·38	9·9
7·5	1·5	...	3·26	...
7·5	2·0	369	3·74	...
7·5	2·5	...	3·61	...
7·5	3·5	...	2·79	33
10	2·0	...	5·73	...
10	3·0	313	5·99	...
10	4·0	...	4·80	...
10	6·0	...	3·18	80

TABLE XXI.—*Spitewinter Clay with Chelford Silica Sand.*

A.F.A. test cylinder, 2 in. × 2 in.; number of blows, 3. Samples dried at 200 deg. C.

Clay. %.	Water. %.	Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength. Lb. per sq. in.
5	1·5	...	2·25	...
5	2·0	182	2·68	...
5	2·5	...	2·41	...
5	3·0	...	2·23	33
7½	2·0	...	4·51	...
7½	3·0	170	4·62	...
7½	4·0	...	3·72	...
7½	5·0	...	2·39	66
10	2·0	...	6·01	...
10	3·0	164	6·58	...
10	4·0	...	5·73	...
10	6·0	...	3·58	88

TABLE XXII.—*P.V.B. Ball Clay with Various Silica Sands.*

Test cylinders 2 in. × 2 in.; number of blows, 3. Samples dried at 200 deg. C.

Base Sand.	Water. %.	Permeability No.	Green Strength. Lb. per sq. in.	Dry Strength. Lb. per sq. in.
Gwersylt *A*.	2	...	2·90	...
	2·5	118	3·08	4·4
	3·5	...	2·15	13·4
Gwersylt *B*.	2	...	3·48	...
	2·5	80	4·64	6·8
	3·5	...	4·05	21·0
Boam No. 4.	1·5	...	2·44	...
	2·0	166	3·18	5·2
	2·5	...	2·55	6·0
K.L. red.	2·0	176	4·67	3·0
	2·5	...	4·51	5·0
	3·5	...	2·68	7·1
Arnold 52.	1·5	...	3·63	...
	2·1	430	2·73	4·9
	2·5	...	1·94	8·4

Moulding Sands and Materials

Other Clays

The Sub-Committee have examined a large number of British clays. In general, the ball clays are strongest as bonds, but one or two fireclays (especially one occurring near Falkirk) have proved equal to the best of the ball clays. Without exception, the dry-strength/green-strength ratio is lower with clays than with Fulbond (or bentonite), the comparisons being made on mixtures of approximately equal green strength and at optimum moisture content. With a higher moisture content than would be suitable for green-sand work, there is a marked increase in the dry strength of all the clay mixtures. With all the clays examined, the thorough admixture of 10 to 20 per cent. of their weight of Fulbond No. 1 (or bentonite) considerably improved their bonding character, the sand mixtures being more plastic, the dry-strength/green-strength ratio improved and the friability on drying decreased. With one or two of the clays, particularly a plastic kaolin, a mixture with 20 per cent. of Fulbond No. 1 (or bentonite) brought about a particularly marked increase in the dry/green-strength ratio. The addition of a small proportion of an organic bond is also advantageous. The trials made suggest that such mixtures will be satisfactory for use in many foundries, and will allow the conservation of stocks of bentonite.

The tests show that the most suitable clays are those containing a high proportion of "clay substances" and a low proportion of uncombined silica. It is necessary that the clays should be finely ground and that the milling of the sand mixture should be thorough. Although with superfine grinding of the clay (or air-separated clay) there is some improvement in bonding power, it is doubtful if the improvement is such as will warrant the cost of this additional process.

Conclusion and Recommendations

The search for British clays which might prove of value for foundry purposes has shown that many such clays occur in quantity in various parts of the British Isles. Following on foundry trials, a number are now in regular use and are giving very good results. The clays differ considerably in the green and dry strengths that they give when milled with silica sand, and also in the ratio of dry strength to green strength. One of the most important points which has emerged during the trials is the great improvement in the properties of such mixtures that can be obtained by using more than one clay in a moulding sand. One example, described above, is the improvement of a mixture of silica sand and ball clay when a proportion of Fulbond No. 1 is added. By selecting suitable clays for such mixtures almost any green strength, dry strength or dry/green-strength ratio required in a foundry can be obtained.

During the preparation of moulding mixtures in which domestic clays act as binder, the importance of sufficiently heavy milling for a sufficiently long time cannot be over-emphasised. In a number of cases unsatisfactory foundry results have been obtained, owing entirely to the lack of appreciation of this point. It is probably even more essential when a mixture of clays is being used instead of a single clay.

When mixtures are prepared in a laboratory for testing, it is usually impracticable to carry out heavy milling, and for this reason moulding-sand mixtures milled in the foundry are nearly always higher in strength than those of laboratory mixtures; this applies to many of the results reported above. Another fact not always appreciated when laboratory results are being considered is that, when an A.F.A. test cylinder is prepared by the standard method, using three blows of the rammer, the ramming of the sand is much less than that usually reached in the foundry, to attain which about ten blows of the rammer are necessary. Thus, in actual use in the foundry a mixture will be higher in green strength and dry strength and lower in permeability than the results given in the standard A.F.A. test.

Where new deposits of clay are being developed, the bonding properties of these clays are often improved if they are allowed to weather, or are kept in a moist condition, for a few weeks before being used. If this has not been done by the suppliers, it should be carried out at the foundry.

(To be continued.)

Spot Welding of Nickel, Monel and Inconel. – The results of an intensive research programme on spot welding are given in a new publication issued by Henry Wiggin & Company, Limited, Grosvenor House, Park Lane, London, W.1. The work deals with the effects of electrode size and shape, the effects of temper and grain size, and the cause and control of porosity. Copies of this publication may be obtained, free of charge, on application.

FIXING PATTERNS ON PLATES

(Concluded from next page.)

slightly bigger in width than the plate is thick; the end is square to the side, and the recess is cut parallel to the sides, this is necessary for accuracy. In this particular case the plate is made of three layers of wood, but the gauge can be used on any type of plate which has the half patterns each side.

The half patterns should first be positioned and fixed in the required position on the one side, as shown in Fig. 7, and after turning the plate over use the gauge as shown in Fig. 8, with the lower leg making contact with the fixed half pattern. The upper leg gives the correct position for the other half (shown dotted). Use the gauge all round the pattern and put two screws in, then check for position before finally putting in any screws or wood dowels that may be required to hold the pattern firm in position. If the gauge will be in constant use, it is advisable to have one made in metal.

FIXING PATTERNS ON PLATES

By "CHECKER."

Patterns that are in halves and have to be placed on plates for moulding machines are mounted on either two separate plates, or on each side of one plate, generally called a double-sided plate. In both cases the patterns must be positioned with accuracy; if not, the castings will show an overlap at the mould joint corresponding with the amount of error.

In almost every case the first things required on the plate are the centre lines, which are used as a basis to work from. This is often done by putting the pins in the plate, and marking the lines each side from a straight edge, as shown in Fig. 1, the centre line being obtained by bisecting these lines. The centre line at right angles to the pins is established by finding the exact centre between the pins: from this point make two marks equal each side, use these as a base, and from both strike an arc each side of the plate; the centre line is found by joining the two intersection points, also shown in Fig. 1.

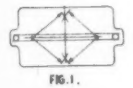


FIG. 1.

FIG. 2.

FIG. 3.

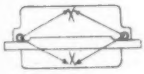


FIG. 4.

FIG. 6.

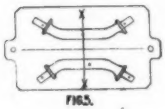


FIG. 5.

The marking of centre lines on plates can, however, be accomplished much quicker by the following method, which can be used on plates large or small whatever the diameter of the pins or pin holes. For each size pin hole in use, a set of two metal pegs is required for the pin holes in the plate. Fig. 2 shows two sizes, the smaller diameters being sliding fits in the pin holes of their respective plates, while the flange diameters are made constant for all sizes; a small hole is turned in the centre of the flanges, suitable to accommodate the point of the trammels. When these pegs are placed in the pin holes of the plate the two centres of the pin holes are automatically given by the holes in the centre of the flanges, and they can be used for striking the arcs each side of the plate, the centre line being given where they bisect; this gives a guaranteed starting point every time without any measurements being taken. For the centre line running between the pin holes, a metal straight edge which has been machined back at each end the exact distance as the radius of the flanges is required, as shown in Fig. 3. When this straight edge is placed in position against the flanges of the self-centring pegs, the centre line can be accurately marked. Fig. 4 shows position of straight edge and lines of intersection for the other centre line.

Once this equipment has been acquired it will last for a considerable time. It may, however, be found that two straight edges will be required of different lengths if the sizes of the plates vary considerably. These straight edges can be easily checked for accuracy by marking the centre line from both sides of the flanges; any discrepancy will then be shown by two lines.

Various methods are used to obtain correct positioning on the plate. Fig. 5 shows two half patterns on one side of a metal plate, the other halves being on the other side. A good method of putting these patterns on plates would be as follows:—Obtain some mild steel rod about $\frac{3}{16}$ in. dia., then drill three holes in each pattern square to the joint, one in each print and one in the centre of the pipe; these pilot holes must be a driving fit for the mild steel rod. Then one half of each pattern is placed in its correct position on the plate, screw holes for holding them in position marked and drilled, and the half patterns on this side are fixed in their permanent positions. The three holes in each pattern mentioned

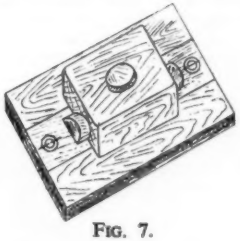


FIG. 7.

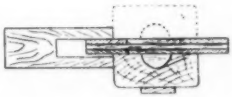


FIG. 8.

previously must then be drilled through the plate, and the other half patterns can be positioned accurately by driving a length of the mild steel rod right through the holes in the half patterns and plate. The rod acting as dowels in both halves assures them being in the true position each side of the plate. The half patterns on this side of the plate are secured by screws going through the patterns and plate, which obtain a good grip in the patterns on the other side; the ends of the rods are filed to the shape of the pattern. Care, however, must be taken to ensure that the half patterns are not mixed; this can be accomplished by drilling the pilot holes in different positions in both patterns.

If the patterns are to be fixed on two plates, the same procedure as before is used, except that after fastening the half patterns on one plate, the holes have to be carried accurately through two plates instead of one. This is done by placing the plates together with two pins of sliding fit or the metal pegs (Fig. 2); when drilling this guarantees the holes in both plates being identical.

Another method of fixing patterns on each side of a plate is to use a piece of wood as a gauge or guide, as shown in Fig. 6, with a recess cut out

(*Concluded on previous page.*)

LAW CASES

Iron and Steel Order Contravened

Fines totalling £250 were imposed at Sutton Police Court, recently, on Autocontrol Boilers, Limited, for contraventions of the Control of Iron and Steel Order.

Defendants pleaded guilty to two summonses for acquiring and three summonses for disposing of iron castings otherwise than in accordance with the Order.

Mr. J. S. Stephenson, prosecuting, said that Autocontrol Boilers, Limited, were a selling agency for a firm with ironfoundries at Rotherham. That firm sold defendants a very large quantity of iron castings described as coal-savers, which were in effect cast-iron firebricks. Defendants sold nearly all of them to Woolworth's, who had already been before another court. Woolworth's gave orders through their various branches to Autocontrol Boilers, who invoiced to the Yorkshire firm, by whom the castings were delivered direct to the branches.

The result was that Woolworth's were supplied with far more than the £10 worth they were entitled to (in the absence of a special licence) in any one month under the Order. In February, 1942, Woolworth's were supplied with £255 worth of castings, and in March with £145 worth.

When a director of Autocontrol Boilers, who was also a director of the foundries, was seen in January of this year, he admitted that there was no licence in force, and that he knew of the restriction to 5 cwts. or £10 worth in one month, but said he thought he was entitled to deal with Woolworth's as so many separate branches. In fact, Woolworth's were only entitled to £10 worth in all; some individual branches actually received more than that. Apart from this, defendants themselves were only entitled to buy £10 of castings from the foundries.

Mr. W. H. Chitty, for defendants, submitted that, although legally Autocontrol Boilers and the foundries were two separate entities, in fact they were one working concern, and the directors of one were directors of the other. The offences were committed unwittingly, because defendants were under the impression that the restriction related to each separate transaction, rather than to each firm dealt with. There was some excuse for coming to that conclusion when one considered the case of a firm like Woolworth's, who with between 700 and 800 branches would only be entitled to about a quarter of a casting per branch per month. That was in effect debarring Woolworth's from dealing with them. In only four cases had the £10 limit been exceeded in respect of an individual branch, and that was due to oversight by the local manager under the stress of staffing difficulties.

Mr. Stephenson pointed out that the position was not that Woolworth's could not get more than £10 worth of castings a month, but that they could not do so without a licence. At one time they had a licence for 4 tons, but apparently they were not satisfied with that, and did not apply for its renewal.

It was stated that the Yorkshire firm had already been before a court in the North.

Defendants were fined £50 on each of the five summonses, and ordered to pay £21 costs.

Partially Dependent on Wife's Earnings

A somewhat unusual compensation claim was made at Walsall County Court, recently, when, on the ground that he was partially dependent on the earnings of his wife, who died on January 10 from shock and burns resulting from an accident while she was following her employment as a coremaker's assistant, Peter Lavery (63), of Oswin Place, Ryecroft, Walsall, claimed £300 compensation from H. W. Lindop & Sons, Limited, malleable-iron founders.

Mr. A. R. Churchill, for the applicant, stated that Lavery himself was able to work part-time only in consequence of injuries he received in an accident in 1940. His wages averaged £2 8s. 4d. a week, and with his wife's earnings, after deductions had been made for rent, coal, and other expenses, there was left for the household expenses £3 7s. 5d. The profit derived by the husband from his wife's contribution was estimated at 13s. 4d. a week. Now, out of his own earnings, he had to pay a woman 15s. a week for looking after the house and helping to prepare his meals, etc.

Mr. R. H. Norris, for the respondents, contended that up to last Christmas Lavery's average wage was higher than that stated, and submitted that he was not partially dependent on his wife according to the definition laid down in the Workmen's Compensation Act, as his own earnings were enough to provide him with the ordinary necessaries of life suitable for his own class and position. The mere fact that there had been some loss was not sufficient to substantiate his claim.

His Honour Judge A. C. Caporn found that the applicant had established a degree of dependency, as his wife at the time of her death was making a substantial contribution to the household expenses, and awarded him £60, with costs.

DAVID BROWN & SONS (HUDDERSFIELD)

Mr. S. S. Hammersley, M.P. (chairman), Mr. T. C. Guthrie and Mr. Robert Officer have resigned from the board of David Brown & Sons (Huddersfield), Limited. They joined the board in July last at the request of the Ministries of Supply and Aircraft Production, as a result of negotiations between Mr. David Brown and these Ministries, with a view to strengthening the board in the national interests, says Mr. Hammersley. They have come to the conclusion that it is no longer possible to carry out the purpose intended. This leaves Mr. David Brown, managing director, as the sole remaining director of the company.

Mr. David Brown states that, with the approval of the Ministry of Production, the requisite steps are being taken to appoint new directors in the place of those who have resigned. The management organisations of the Huddersfield company and David Brown Tractors, Limited, and the production of both companies are unaffected by the resignations.

WORKMEN'S COMPENSATION ACT, 1943

NEW PROVISIONS AND CHANGES EXPLAINED

Under the Workmen's Compensation Act, 1943, recently passed, the employer's liability means a "weekly payment" which may run to 35s., plus 4s. for the first two children (or only child), 3s. for any other child, while the employee remains unable to work, or a lump sum payment to his dependant(s) if the injury proves fatal. For total dependency this lump sum may run to £300 (that is £200 or three years' earnings if more, £300 being the maximum), or if there are children to £600. If the dependant is only partially dependent, the amount will be a sum considered reasonable and proportionate to the loss sustained by the particular dependant. It naturally follows that in the past if the dependant (*e.g.*, wife) had earned money, this would mean only partial dependency, and so the compensation would be less than if wholly dependent.

Many women are now obliged to work by law (*e.g.*, war work), and so the position has arisen that if the husband is fatally injured at work, the wife would get little or no compensation by reason of this work obligation, although ordinarily she would have been fully dependent on the husband, she herself not earning money or having any intention of doing so. This new Act, therefore, provides, that if the earnings of the wife (applies also to a female relative acting as housekeeper) have come from employment which would not have been undertaken but for the war (work entered into on or after September 3, 1939), these earnings are to be disregarded or partly so when determining the lump-sum payment. This provision does not apply, however, where death occurred before February 4, 1943.

For total disablement the "weekly payment" is one-half of the average (pre-injury) weekly earnings (subject to the maxima mentioned earlier); for partial disablement one-half of the difference between the earnings before the injury and the earnings possible after the injury (*e.g.*, light work). It might be added that for earnings of "under 50s. weekly," the percentage works out at slightly more than the "one-half" for bigger earnings. With wartime remuneration rates increased, this fact has operated adversely, especially for partially disabled persons, as the fact of the increase has wiped out any difference between wages in the pre-injury job and the job after the injury, with consequent loss of part of or the whole of the weekly compensation payment, given in respect of the injury. This new 1943 Act now obviates this, as it provides that any increase in post-injury wage rates shall be added to the pre-injury earnings which determined the compensation, and so the original weekly compensation payment will remain the same, as will be seen by the following example.

The average weekly earnings were £3 at the time of the injury, the employee earning £2 afterwards. Consequently, there is a difference of £1, "one-half" of which makes the compensation 10s. weekly. Suppose the wartime rates increased the £2 to £3 10s., or to an amount more than the pre-injury earnings, then under the previous Act the compensation was entirely lost. By the 1943 measure, however, the 30s. increase (£3 10s. instead of £2) is added to the pre-injury £3, making £4 10s., to operate for computing compensation; set against this the present earnings of £3 10s. gives a difference of £1 as formerly, making the compensation (one-half) 10s. as originally granted. This new provision will apply to both total and partial disablement cases, and in respect of injuries and wage increases since January 1, 1924; but the actual payments brought about by this new approach will only apply from February 4, 1943.

The new Act also extends the provisions of the Acts which enable compensation schemes to be made for fibrosis of the lungs due to silica or asbestos dust, so that schemes can be made for "pneumoconiosis," this expression meaning fibrosis of the lungs due to silica dust, asbestos dust or other dust, and includes the condition of the lungs known as dust reticulation.

AUSTRALIAN INDUSTRIES

The war has given a great fillip to industrial expansion in Australia. The heavy industries, of course, centre in the activities of the Broken Hill Proprietary Company, whose "B.H.P. Review" regularly records the important work being done in connection with the war effort. The "Christmas" issue now to hand deals with the growth and development of shipbuilding at Whyalla, where ships are being built under the Australian Shipbuilding Board's programme. The launching of one of these vessels is described in the "Review." They are 400 ft. long between perpendiculars, 56 ft. beam and 34 ft. 6 in. to the shelter deck, the gross tonnage being 4,812 tons and deadweight 8,050 tons.

Not only are the ships themselves being built but the triple expansion direct-acting reciprocating engines as well. These are being turned out by the associated company, the Australian Iron & Steel, Limited, Kembla. These engines are designed to develop 3,500 h.p. at 85 r.p.m., working on a steam pressure of 220 lbs. per sq. in. and 620 deg. F. superheat. The engines are 23 ft. long by 11 ft. 9 in. wide and 23 ft. high, weighing about 100 tons. The engines assembled in the shops rest in excavations made in order to allow the tops of the upper portions to clear the roof. It may be mentioned that quadruple expansion marine engines are also being made in Australia.

Electric Furnaces in the United States

American production of industrial electric furnaces was 16 times greater during the first six months of 1942 than during any pre-war half year, according to C. L. Ipsen, manager of electric heating sales for General Electric. One of the most recent wartime applications of electric furnaces is in annealing steel cartridge cases. The use of steel as a substitute for brass, now scarce, has created a new demand for electric annealing furnaces.

THE NATIONAL STOCK LIST

HOW SALVAGE SAVES SHIPPING

Of particular interest to foundrymen is the way in which the drive to recover every available item of metal, both ferrous and non-ferrous, affects shipping. Shipping is of vital importance, not only for bringing foodstuffs and the raw materials for conversion to war materials, etc., but also as a major factor in our offensive plans. Every six cartloads of salvaged material retrieved in this country may save sufficient cargo space for enough food for a whole company of soldiers for a fortnight, or enough bombs to load up a Stirling bomber.

These factors bring into prominence the extremely useful National Stock List, first published by the Ministry of Supply in January, 1942. This comprises an exhaustive list of surplus processed raw materials (ferrous and non-ferrous), and of plant and machinery which have arisen from cancelled or amended contracts, or from the excessive trade stocks of contractors. Localities where these stocks are to be obtained are given, and the List is now instrumental in the regular transfer of vital war material totalling several thousand tons per month. Members of the foundry industry will find much to interest them in this useful publication, which may be had post free from the Directorate of Economy, Ministry of Supply, Berkeley Court, Baker Street, London, N.W.1.

Copper, brass and alloys in many forms and grades are listed in the non-ferrous section, and there is a very useful section which lists contractors' plant for disposal. The offers contained in the National Stock List naturally vary from month to month and a new issue dated the first of each month automatically cancels previous lists. It is important to point out that the goods listed can only be secured against a specific contract, and against information as to the purpose for which the material will be used in connection therewith. Naturally, material cannot be reserved unless it is for the national effort.

As an illustration of the way in which the scheme works, it is reported that in a certain Midlands town there were two adjacent war production plants of which one had a surplus of material urgently required by the other for the completion of an important contract. They were put in touch with one another through the National Stock List, and the transfer of material was made within a few days. The Ministry of Supply has received hundreds of letters of appreciation from firms where the National Stock List has proved of real service.

Firms which have changed their type of work to meet war production needs are frequently in the position of holding supplies which are no longer of use to them, or, on the other hand, of needing metals which they do not normally stock. The National Stock List can be used by all such firms with mutual advantage, if they will make their surplus or requirements known.

WIN PEACE WITH WASTE PAPER!

NEW RESTRICTIONS ON BUSINESS USE OF PAPER

Under new Control of Paper Orders the maximum size of most cheques is to be 6 in. by 3 in., and the substance of the paper which may be used is prescribed. No headed letter paper for trade, commercial, or professional use may exceed 57 sq. in. or be of a substance greater than that set out in the Order. Dividend warrants or tax deduction forms may not exceed 21 sq. in. separately or 42 sq. in. together. Wherever possible, smaller sizes of notepaper than the maximum should be used, and 40 sq. in. is recommended for ordinary use. Both sides of the paper should be used.

The maximum size of paper generally to be used for company reports and accounts, notice of the general meeting of the company, and record of any speech to be delivered in such meeting must not exceed in the aggregate 120 sq. in. (including any envelope used for the despatch of such accounts, etc.). Where summarised or consolidated accounts are distributed, the size may be increased to 180 sq. in.

The distribution of certain types of advertising matter is prohibited unless a prior charge of not less than 1d. is made. Many firms which were in the habit of distributing free advertising matter made wholly or mainly of paper or paper board, *e.g.*, diaries and calendars, falling within the Schedule to the Location of Retail Businesses Order, may now require a licence under that Order before they may sell them. In order to save time and paper, a General Licence has been issued which permits firms to sell such articles at a price not exceeding 1d. without the necessity of applying for an individual licence, provided that they distributed them free during the period September 1, 1939, to August 31, 1940.

COMBINED ALUMINIUM COMMITTEE

A Combined Aluminium Committee, representing the United Kingdom, United States and Canada, has been established to co-ordinate the activities of the three countries in respect of aluminium.

Mr. Charles E. Wilson (executive vice-president of the War Production Board in Washington) will be chairman, and other members are Sir Richard Fairey (Director-General of the British Aircraft Commission in Washington), and Mr. George C. Bateman (Metals Controller of Canada).

The Committee will report its findings and actions to the Combined Production and Resources Board and the Combined Raw Materials Board.

MR. DAVID LLOYD, works manager of the Bowesfield, Stockton, works of Dorman Long & Company, Limited, has retired after 50 years' service with the company, six of which have been spent at Stockton. His retirement recently was marked by presentations from the men.

STANTON

Dale

REFINED

PIG IRON

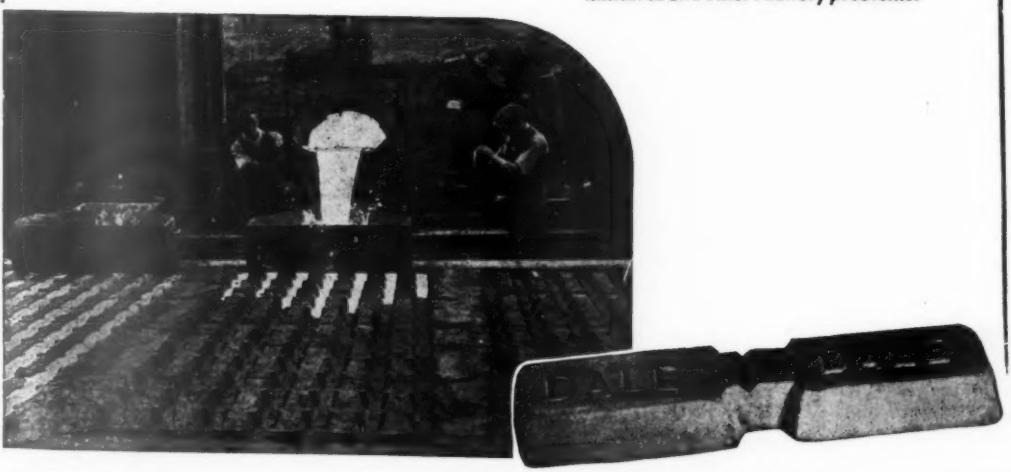
IS CHARACTERISED by closeness of grain structure, uniformity of composition and fine graphitic carbon evenly distributed.

IS PRODUCED to guaranteed analysis in seven standard grades.

CAN BE MADE to customers' individual requirements with total carbon from 2·6 per cent. upwards.

SHOULD BE USED to tone up high phosphorus irons and scrap, to replace Hematite, and to produce castings for all high duty purposes.

Users are invited to avail themselves of the Stanton Technical Service which offers free expert advice on special mixtures and other Foundry problems.



THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

NEWS IN BRIEF

IRONFOUNDERS in the Falkirk area have agreed that the trade's summer holidays should commence this year on July 2 instead of the last Friday in June, which is the usual date.

SIR JOHN DUNCANSON has arrived in the United States on behalf of the Iron and Steel Control. With a representative of the U.S. steel industry, he is to make a survey of steel production and resources in Australia, New Zealand, India and South Africa.

AT A RECENT MEETING in Falkirk to celebrate the jubilee of the Central District of the General Iron Fitters' Association of Scotland, twelve members were presented with tokens to commemorate their long service.

A STATEMENT ACCOMPANYING the report and accounts of Baldwins, Limited, by the vice-chairman of the company, Col. J. B. Neilson (the chairman, Sir Charles Wright, has temporarily resumed his duties as Controller of Iron and Steel), points out that for some years past one of the companies in the group has been mainly employed in the production of light alloys. This company is to be absorbed during the current year by the parent company and future accounts will show the effect of this. The company has increased its tonnage and range of alloy steels.

BIRMINGHAM EXCHANGE, meeting place of the metal and coal trades for 80 years, may have a new building and extended facilities after the war. The possibility was put forward by the president, Mr. H. M. Crankshaw, at the annual meeting. The question had to be asked, he said, whether the Exchange had outlived its usefulness. It was obvious that there was still vitality, but its functions should be widened and put on a different basis. He thought they should have a building worthy of Birmingham and should begin to think about choosing a site and designing an exchange on modern lines.

PERSONAL

MR. C. C. GRIFFITH has been elected a director of Engineering Components, Limited.

DR. ANDREW M'CANCE has been elected a Fellow of the Royal Society. Graduating from the Royal School of Mines in 1910 he joined the staff of Wm. Beardmore & Company, Limited, where he was assistant armour manager. In 1916, London University conferred upon him the degree of Doctor of Science and in 1919 he founded and became managing director of the Clyde Alloy Steel Company, Limited. In 1930 he was appointed a director and general manager of Colvilles, Limited. He is also a director of several other companies. Three years ago the Iron and Steel Institute awarded him the Bessemer gold medal in recognition of his outstanding services in the application of science to the iron and steel industry. He is a member of the Councils of the Iron and Steel Institute and the Institute of Welding and a past-president of the West of Scotland Iron and Steel Institute.

WAGES IN ENGINEERING

The National Arbitration Tribunal, which heard the wage claim of the engineering unions recently, has made its award. The unions asked for an all-round increase of basis rates by 11s. a week; an increase equivalent to 33¼ per cent. of basis rates to all plain-time workers; and restoration of overtime and analogous rates to the level at which they stood in the early part of 1931. In reply the employers offered to add 6s. a week in the form of bonus to plain-time earnings, at the same time varying the earnings of the lower-paid pieceworkers to maintain their relative position; and to consolidate 20s. of the bonus in the basis rates, but with a readjustment of piece rates since, in the employers' opinion, the earnings of the higher-paid pieceworkers did not call for adjustment.

The Arbitration Tribunal awards a consolidation of 20s. of the bonus in the basis rates of both plain-time and piece-rate workers; an addition of 6s. a week to the bonus of plain-time workers (bringing it, as revised, to 21s. 6d. a week), while the bonus of piece-rate workers will be 13s. 6d.; and adjustment of piece-work prices and bonus and basis times so as to enable a workman of average ability "to earn at least 27½ per cent. over basis rates as provided in this award, excluding the national bonus." This represents an increase of 2½ per cent. over the present minimum standard for piece-rate earnings.

IRON AND STEEL SCRAP CONTROL

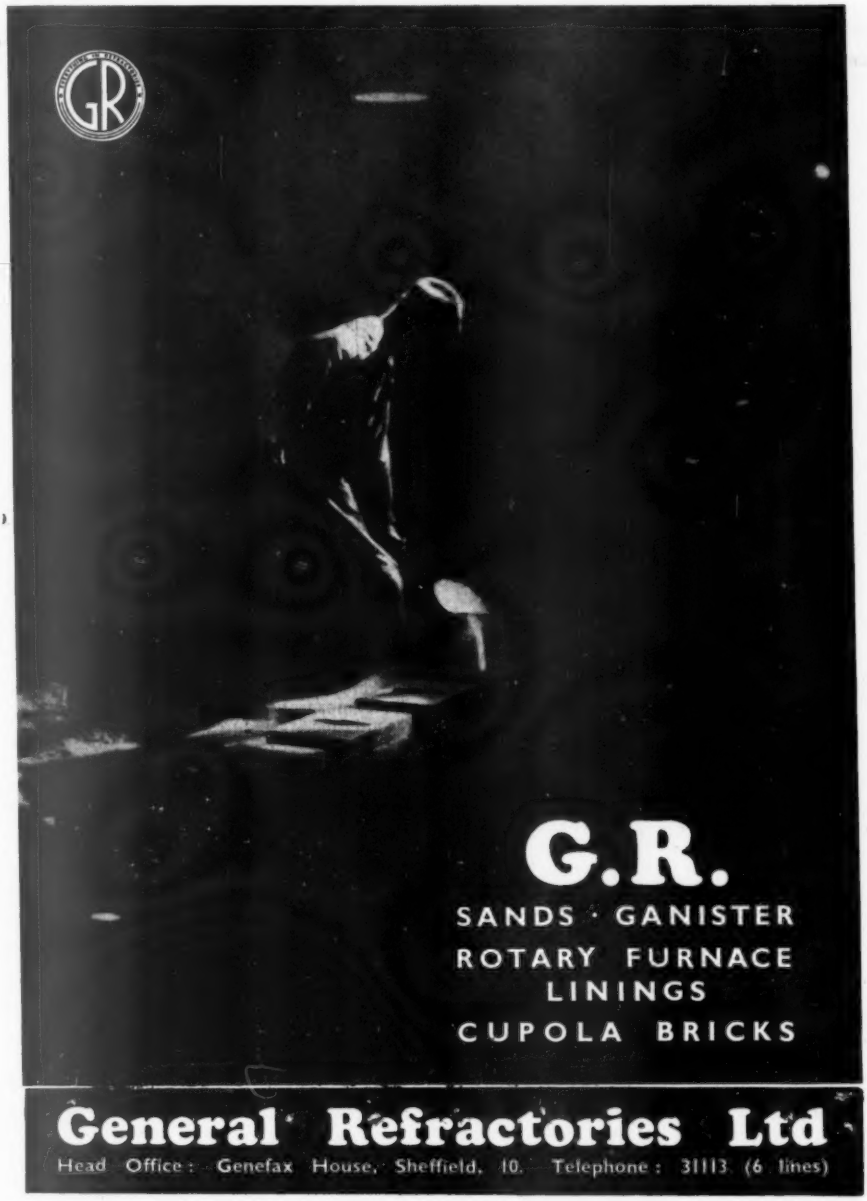
The Minister of Supply has issued the Control of Iron and Steel (No. 30) (Scrap) Order, 1943 (S.R. & O. No. 435), which came into force on March 29, and supersedes all previous Scrap Iron and Steel Orders. The Order has been issued principally for the purpose of combining in one document the provisions of the Nos. 14, 21, 24, 25, 27, and 29 Scrap Orders, although the opportunity has been taken of effecting a number of alterations in wording for the sake of consistency in both the body of the Order and the specifications set out in the Price Schedules. Copies of the Order can be obtained from H.M Stationery Office, York House, Kingsway, London, W.C.2.

OBITUARY

MR. ROBERT BRUCE MASON, a director of Mason Bros. (Smelters), Limited, Dewsbury, died suddenly on March 21, aged 49.

MR. JAMES STARK, formerly manager of the fitting shop of Walter Macfarlane & Company, Limited, Saracen Foundry, Possilpark, Glasgow, has died, aged 77.

MR. JAMES MUIR BISSELL, managing director of James Bissell & Company, Limited, manufacturing engineers, of Anniesland, Glasgow, died recently as the result of a motor accident in which his father, Mr. James T. Bissell, and his mother also were killed.


G.R.
SANDS · GANISTER
ROTARY FURNACE
LININGS
CUPOLA BRICKS
General Refractories Ltd
Head Office: Genefax House, Sheffield, 10. Telephone: 31113 (6 lines)

GP 171

COMPANY NEWS

(Figures for previous year in brackets.)

Heenan & Froude—Interim dividend of 5% (same).

Peters—Net profit for 1942, after charging all expenses, depreciation, and E.P.T., £54,832 (£54,287); final dividend of 7½%, making 15% (same).

Clayton Dewandre—Net profit for 1942, after providing for taxation, £39,127 (£36,237); to general reserve, £7,500; dividend of 10% (same), £27,300; forward, £13,582 (£9,256).

British Insulated Cables—Net profit for 1942, £557,180 (£547,348); ordinary dividend of 20%, including 5% bonus (same); to war contingencies account, £100,000 (same); forward, £428,227 (£478,547).

Hadfields—Trading profit for 1942, £254,481 (£259,271); net profit after debenture interest, etc., £202,264 (£198,904); preference dividend, £6,750; final ordinary dividend of 15%, making 22½% (same); forward, £733,237 (£659,022).

P. & W. Maclellan—Profit for 1942, after tax and contingencies, £44,690 (£43,155); debenture interest, £6,561 (same); depreciation, £7,500 (same); deferred repairs, £3,000 (nil); reserve, £5,000 (same); dividend of 6%, £20,520 (same); forward, £8,075 (£8,466).

Cammell Laird & Company—Net profit for 1942, after providing for depreciation, debenture stock interest and sinking fund, taxation, deferred repairs and other charges, £192,122 (£186,548); dividend of 10% (same); to general reserve, £100,000; forward, £105,983 (£102,611).

Guest Keen Baldwins Iron & Steel Company—Profit for 1942, after tax and deferred repairs, £661,043 (£626,950); depreciation, £375,000 (£350,000); net profit, after debenture and note service and fees, £133,425 (£124,568); dividend on the ordinary shares of 5% (same).

Universal Grinding Wheel—Profit for the year to September 26, 1942, after E.P.T. and income-tax, £64,624 (£47,482); ordinary dividend of 10% (same), tax free; participating dividend on preference shares of 2%, less tax; to reserve, £25,000 (£20,000); forward, £12,313 (£6,689).

International Combustion—Profit for the year to September 30, 1942, £222,553 (£197,769); to reserve for taxation, £142,225 (£132,255); special provision for undue wear and tear, £20,000 (nil); final ordinary dividend of 15%, with bonus of 10%, making 30% for the year (same); forward, £32,678 (£29,625).

Lancashire Dynamo & Crypto—Full report shows profit for 1942, after charging £10,705 for depreciation and providing for fees, income-tax, E.P.T., etc., £122,020 (£111,015); dividend on the cumulative preference shares at 5½%, £3,300; dividend at 15% and bonus of 7½% on the ordinary shares, £90,000; to staff pension fund, £3,000; forward, £169,603 (£143,884).

British Aluminium Company—Net profit for 1942, £1,051,119 (£973,582); fees, £31,250; income-tax, £225,000; debenture stock service fund, £175,000; reserve for depreciation, £50,000; reserve account, £150,000; dividend of 6% on the preference stock, £90,000; interim dividend of 3% on the ordinary stock, £90,000; final dividend of 7%, £210,000; forward, £251,997 (£222,128).

English Steel Corporation—Trading profit for 1942, after taxation, contingencies and deferred repairs, and including income from investments, £708,958 (£662,347); depreciation, £300,000 (same); net profit, after debenture service and fees, £326,636 (£280,024); dividend on the deferred capital of 17½%, tax free (same); forward, after preferred and deferred dividends, £157,735 (£107,056).

Swan, Hunter & Wigham Richardson—Profit for 1942, including interest and after tax provision, £359,616 (£313,160); dividends, less tax, from subsidiaries and other investments, £74,144 (£83,709); investment reserve not now required, £12,172; final ordinary dividend of 6%, making 10% (same); to staff pensions, £50,000; to reserve, £125,000 (£70,000); forward, £37,658 (£33,137).

Baldwins—Profit for 1942, including dividends and interest from subsidiary companies and from investments, and after providing for taxation, special expenditure at collieries and deferred repairs, £330,939 (£316,645); depreciation, £140,000; fees, £5,863; net profit, £185,075 (£185,805); preference dividends, £51,179; dividend of 10% (same) on the ordinary stock, £124,737; forward, £63,431 (£54,272).

SILICOSIS AMONG FOUNDRY WORKERS

SIR J. WARDLAW-MILNE asked the Home Secretary whether any investigation had yet been made as to the extent to which silicosis had been contracted by workers in the foundry trade.

MR. H. MORRISON replied that certain processes in steel foundries were known to give rise to silicosis, and workers employed in these processes were covered by the compensation scheme for this disease. He had recently received representations that the scheme should be extended to cover other processes, *e.g.*, work done on the foundry floor, which had not hitherto been thought to expose the workers to risk of the disease. Further inquiries were being made, but the results were not yet available.

CONTRACTS OPEN

The date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Glasgow, April 9—Bolts and nuts, brass cocks, etc., cast-iron pipes, special castings, etc., for 12 months from June 1, for the Gas Department. The General Manager, Gas Department, 30, John Street, Glasgow, C.1.

Glasgow, April 10.—Iron castings, fire-clay goods, etc., for the Corporation (Statute Labour Department). The Office of Public Works (Room 81), City Chambers, Glasgow.

Perth, April 10—S. and F. fireclay pipes, cast-iron street gullies and manway covers, for the year from May 15, for the Town Council. The Burgh Surveyor's Office, 16, Tay Street, Perth.

APPLICABILITY

Since the day when the 'wooden walls of England' ploughed their perilous way across the seven seas, it is not too much to say that the revolutionary progress in ship design, construction and performance has run parallel with metallurgical discovery. In the present era the illimitable applicability of Aluminium Alloys offers ever wider scope to the ship designer intent of saving weight and increasing carrying capacity. In this development we shall keep pace, adapting our product to the needs of its users . . . For we produce Aluminium Alloys for every conceivable purpose. *Tomorrow it will be for the greyhounds of the oceans.*

INTERNATIONAL ALLOYS LTD.

SLOUGH · BUCKS

TELEPHONE SLOUGH 23212 · TELEGRAMS INTALLOYD SLOUGH

FOUNDRY TRADE JOURNAL

EST. 1902

VOL. 69. No. 1389.
Registered at the G.P.O. as a Newspaper

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL
APRIL 1, 1943
Offices: 49, Wellington Street, Strand, London, W.C.2

[Single Copy 6d. By Post 8d. Annual Subscription, Home and Overseas 21/- (Prepa

PIG IRONS
FOR ALL PURPOSES

•

PRIESTMAN
FOUNDRY COKES

•

"LEEFRA" REFRACTORIES
MANSFIELD MOULDING SAND
GANISTER · LIMESTONE · SEA SAND
CORE OILS · FOUNDRY BRUSHES & SUPPLIES

THOS. W. WARD LTD.
ALBION WORKS · SHEFFIELD

TELEPHONE: 86311 (15 Lines) TELEGRAMS: "FORWARD, SHEFFIELD"